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Conference Abstract

Mesoamerica's Crop Wild Relatives: A new approach for conservation planning

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Abstract

Crop wild relatives (CWR) are wild plants that are the ancestors of important crops for human well-being. CWR hold genetic diversity that can be vital for plant breeding programs and the sustainability of agriculture, particularly given global change. Conservation of CWR genetic diversity thus has become a global food security issue, and several countries are actively developing conservation strategies including the generation of a national checklist and inventory of CWR, the assessment of current threat status, the identification of knowledge and conservation, and the establishment of genetic reserves. In this context, Mexico, Guatemala, and El Salvador, in collaboration with experts abroad (University of Birmingham, UK, and IUCN), are working together in a project to contribute towards safeguarding Mesoamerican CWR (http://www.psmesoamerica.org/en/).

One important step is to identify CWR conservation area networks framed within the systematic conservation planning approach. However, genetic diversity is generally not addressed during the planning process. As it is unfeasible to sample and perform genetic analyses of hundreds of species due to limited timeframes and conservation budgets, we

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propose a novel approach to overcome the lack of genetic data. We used two criteria to develop proxies for genetic diversity (PGD):

1. environmental variability, as given by climate, soil and topographic spatially-defined variables; and
2. historic differentiation, as shown by phylogeographic patterns found in other species of the same habitat and region.

We tested our approach by using genomic data from an empirical study of maize wild relatives distributed in Mexico. By combining species distribution models of 120 Mesoamerican CWR taxa and 102 PGD, we delimited areas of potential population differentiation. Furthermore, we considered each taxon's IUCN Red List category and habitat preference, assessed by experts during the project, to determine areas for CWR conservation in Mexico, using the Zonation conservation planning tool.

Areas identified as important for CWR *in situ* conservation are located within sites of high cultural diversity and in areas where agriculture originated and traditional agriculture is ongoing. Also, our study design maximizes the representation of CWR throughout its distribution, thus highlighting the need for comprehensive analysis to encompass the genetic variability of taxa. The results of this work represent a first national and regional guide to promote CWR *in situ* conservation and sustainable management that contributes towards achievement of the CBD Global Strategy for Plant Conservation, Sustainable Development Goals and Aichi Targets.

Keywords

agrobiodiversity, proxies of genetic diversity, systematic conservation planning, Mexico

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